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10/607,870

06/27/2003

Kentin L. Alford

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EXAMINER

JOLLEY, KIRSTEN

ART UNIT

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|--------------------------------------|--------------------------------------|--|
| Office Action Summary | Application No. 10/607,870 | Applicant(s) ALFORD ET AL. | |
| | Examiner Kirsten C. Jolley | Art Unit 1792 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 April 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-7,14-18,30,32-37 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-7,14-18,30 and 32-37 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>5/8/08</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on April 22, 2008 has been entered.

Priority

2. Applicant's claim for the benefit of a prior-filed application under 35 U.S.C. 119(e) or under 35 U.S.C. 120, 121, or 365(c) is acknowledged. Applicant has not complied with one or more conditions for receiving the benefit of an earlier filing date under 35 U.S.C. 120 as follows:

The later-filed application must be an application for a patent for an invention which is also disclosed in the prior application (the parent or original nonprovisional application or provisional application). The disclosure of the invention in the parent application and in the later-filed application must be sufficient to comply with the requirements of the first paragraph of 35 U.S.C. 112. See *Transco Products, Inc. v. Performance Contracting, Inc.*, 38 F.3d 551, 32 USPQ2d 1077 (Fed. Cir. 1994).

The disclosures of the prior-filed applications, Application Nos. 10/346,866, 09/528,345, and 09/272,762, fail to provide adequate support or enablement in the manner provided by the first paragraph of 35 U.S.C. 112 for one or more claims of this application.

Claims 1 and 30 have been amended to no longer recite a pressure of at least 30 psi, and therefore the priority date of independent claims 1 and 30, as well as dependent claims 14-15 and 32-33 are entitled the filing date of the parent applications of March 19, 1999. However, dependent claims 3-7, 16-18, and 34-37 contain limitations that were not disclosed in the parent applications (i.e., the specific pressures claimed, use of glass or carbon or silicon wafer or silicon carbide, or broad aluminum-comprising or titanium-comprising substrates, as well as claimed exposure times). The priority date of dependent claims 3-7, 16-18, and 34-37 are thus given the priority date of the instant application of June 27, 2003.

Response to Arguments

3. Applicant's arguments filed April 22, 2008 have been fully considered but they are not persuasive.

With respect to the rejections over Mankell et al. in view of Combes et al. or Fukushima et al., Applicant argues that Mankell does not disclose or suggest the recited monolayer formation or the recited subsequent incorporation into a fiberglass matrix by bonding the organic group of the monolayer within a polymeric layer.

With respect to the first argument of monolayer formation, the Examiner notes that while Mankell et al. does not specifically state that the coating compound is applied as a monolayer, the bonding mechanisms taught by Mankell et al. in paragraph 0015 are similar to those used in monolayers -- namely, a compound with a first group that has functionality capable of interacting with the Si or OH groups on the fiberglass substrate, and another functional group (at the opposite end) having hydrophobic properties, thus providing hydrophobic properties to the

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coated substrate. Additionally, the coating compounds of Mankell et al. are materially similar to those taught in Combes et al. and Fukushima et al. which both form monolayers. Mankell et al. discloses use of alkyl silyl halides, namely octadecyl trichlorosilane or dimethyldichlorosilane (paragraphs 0015 and 0016). Combes et al. similarly discloses octadecyl trichlorosilane and dimethyldichlorosilane as exemplary coating/monolayer materials (col. 5, lines 10 and 16), and Fukushima et al. discloses similar alkyl silyl halide such as $\text{Si}(\text{CH}_2\text{CH}_3)_2\text{Cl}$ (paragraph 0030). For these reasons, it is the Examiner's position that the coating compound of Mankell et al. is actually applied as a monolayer, even though not specifically stated.

With respect to the second argument regarding the incorporation into a fiberglass matrix by bonding the organic group of the monolayer within a polymeric layer, the Examiner notes that the rejections are now applied in view of the Tutin et al. or Buck references. Tutin et al. and Buck demonstrate that conventional fiberglass binders are polymeric, and further that such conventional fiberglass binders may be epoxy resins. Applicant's own specification discloses in paragraph 0057 that covalent bonding occurs between the organic group of the monolayer and a polymeric binder such as an epoxy binder. Therefore it is the Examiner's position that covalent bonding between the organic group of the coating/monolayer of Mankell et al. and a polymeric binder, such as an epoxy binder, would necessarily occur since the materials and process steps of the combined references are materially similar to those of the instant invention.

Claim Objections

4. Claim 7 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the

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claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 7 requires that the substrate is glass which is already required in independent claim 1.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1, 3-7, 14-18, 30, and 32-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mankell et al. (US 2002/0127399) in view of Combes et al. (US 5,725,987), and further in view of Tufin et al. (US 2004/0034154) or Buck (US 6,039,821).

Mankell et al. discloses a method of providing a glass fiber having a surface, and coating the glass fiber with a compound containing functionalized silicon including an organic group covalently attached with the silicon. Mankell et al. teaches that the coating compound is preferably an alkyl silyl halide, such as octadecyl trichlorosilane or dimethyldichlorosilane (paragraphs 0015 and 0016). Mankell et al. further teaches that the coating compound may be applied to the glass fiber prior to or at the same time as the addition of binder to the fiberglass during the formation of fiberglass batts (paragraph 0018). While Mankell et al. does not specifically state that the coating compound is applied as a monolayer, it is noted that the bonding mechanisms taught by Mankell et al. in paragraph 0015 are similar to those used in

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monolayers -- namely, a compound with a first group that has functionality capable of interacting with the Si or OH groups on the fiberglass substrate surface, and another functional group (at the opposite end) having hydrophobic properties, thus providing hydrophobic properties to the coated substrate.

Mankell et al. lacks a teaching of exposing the glass fiber surface in a supercritical fluid. Combes et al. is cited for its teaching of methods for forming a monolayer of functionalized silicon including an organic group on a substrate surface. Combes et al.'s method comprises exposing the substrate surface to a silane precursor using supercritical carbon dioxide as a solvent, the precursor interacting with the substrate to form the monolayer across the surface of the substrate. Combes et al. discloses at col. 4, lines 50-55 that the organosilanes form a coating on the oxide substrates by reacting with surface OH groups on the oxide to form a surface-oxygen-silicon treated surface. While Combes et al. does not explicitly state that a monolayer is formed, since the coating is only formed by reaction of the organosilanes with surface OH groups, a monolayer must inherently be formed since reaction/coating will not continue once all of the OH surface groups are reacted. Combes et al. teaches that its process is useful on silicon dioxide substrates---glass is made of silicon dioxide. Combes et al. teaches use of octadecyltrichlorosilane and dichlorodimethylsilane as monolayer compounds (col. 5, lines 10 and 16), both of which are also taught as preferred coating compounds in Mankell et al. It would have been obvious for one having ordinary skill in the art, seeing the references of Mankell et al. and Combes et al. in combination, to have used supercritical carbon dioxide as the solvent for applying the functionalized silicon compound on fiberglass fibers in the process of Mankell et al. with the expectation of improved quality and integrity of the coating, and because it is an

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inexpensive, non-toxic, non-flammable application process. Further, one having ordinary skill in the art would have expected successful results since Mankell et al. is not limited to the application method used and teaches that the coating composition can be applied in a suitable carrier (paragraph 0018), as well because Mankell et al. and Combes et al. similarly teach coating of the same alkyl halyl silanes compounds on glass/silicon dioxide substrates.

Mankell et al. further lacks a teaching that incorporation of the glass fiber into a fiberglass matrix is performed by bonding the organic group within a polymeric material. Mankell et al. discloses that a binder composition conventionally used in the fiberglass industry is applied to the fiberglass matrix either after, or at the same time as, its coating composition (paragraph 0018). Tutin et al. and Buck are cited for their teachings of the conventionality of using epoxy resins as binders in fiberglass batts/matrices (see abstract of Tutin et al., and abstract and col. 11, lines 17-20 of Buck). It would have been obvious for one having ordinary skill in the art to have selected any conventional fiberglass binder, including an epoxy binder as taught by Tutin et al. or Buck, in the fiberglass batt construction process of Mankell et al. with the expectation of successful results, since Mankell et al. specifically states that any conventional binder may be used and is not limiting. It is noted that the use of Mankell et al.'s composition in combination with an epoxy polymeric binder would necessarily include covalent bonding of the organic group of the Mankell et al.'s coating composition within the polymeric binder, since the process of Mankell et al. and applicant use materially similar monolayer/coating materials. This is evidenced by Applicant's own specification in paragraph 0057, which discloses that epoxy polymers have covalent interactions with the monolayers of its invention.

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As to claims 3-6 and 34-37, carbon dioxide is supercritical at pressures greater than 1073 psi. Combes et al. teaches using a pressure of 80-700 bar (col. 4), or 1160 to >10,000 psi.

As to claims 15 and 32-33, Combes et al. teaches using chlorosilane precursors in col. 5, lines 9-22.

As to claim 14, Combes et al. teaches that there is atmospheric water in the reactor (col. 4, lines 21-23) which would necessarily form a film of water across a surface of the substrate.

As to claims 16-18, Example I discloses exposing the substrate to the precursor for a time of 30 minutes.

7. Claims 3-7, 16-18, and 34-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mankell et al. (US 2002/0127399) in view of Fukushima et al. (US 2002/0197879), and further in view of Tutin et al. (US 2004/0034154) or Buck (US 6,039,821).

Mankell et al. discloses a method of providing a glass fiber having a surface, and coating the glass fiber with a compound containing functionalized silicon including an organic group covalently attached with the silicon. Mankell et al. teaches that the coating compound is preferably an alkyl silyl halide, such as octadecyl trichlorosilane or dimethyldichlorosilane (paragraphs 0015 and 0016). Mankell et al. further teaches that the coating compound may be applied to the glass fiber prior to or at the same time as the addition of binder to the fiberglass during the formation of fiberglass batts (paragraph 0018). While Mankell et al. does not specifically state that the coating compound is applied as a monolayer, it is noted that the bonding mechanisms taught by Mankell et al. in paragraph 0015 are similar to those used in

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monolayers -- namely, a compound with a first group that has functionality capable of interacting with the Si or OH groups on the fiberglass substrate surface, and another functional group (at the opposite end) having hydrophobic properties, thus providing hydrophobic properties to the coated substrate.

Mankell et al. lacks a teaching of exposing the glass fiber surface in a supercritical fluid. Fukushima et al. is cited for its teachings of methods for forming a monolayer of functionalized silicon including an organic group on a substrate surface. Fukushima et al.'s method comprises exposing the substrate surface to a silane precursor using supercritical carbon dioxide as a solvent, the precursor interacting with the substrate to form the monolayer across the surface of the substrate. Fukushima et al. teaches that its process is useful on glass substrates (paragraph 0020), and results in an inexpensive, non-toxic and non-flammable process which facilitates formation of monolayers having good quality and surface integrity (paragraphs 0012-0013).

Further, Fukushima et al. teaches use of $\text{Si}(\text{CH}_2\text{CH}_3)_2\text{Cl}$ as a preferred monolayer compound (paragraph 0016), which is materially similar to the preferred coating compounds taught by Mankell et al. It would have been obvious for one having ordinary skill in the art, seeing the references of Mankell et al. and Fukushima et al. in combination, to have used supercritical carbon dioxide as the solvent for applying the functionalized silicon compound on fiberglass fibers in the process of Mankell et al. with the expectation of improved quality and integrity of the coating, and because it is an inexpensive, non-toxic, non-flammable application process. Further, one having ordinary skill in the art would have expected successful results since Mankell et al. is not limited to the application method used and teaches that the coating composition can be applied in a suitable carrier (paragraph 0018), as well because Mankell et al.

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and Fukushima et al. both teach coating of similar alkyl halyl silanes compounds on glass substrates.

Mankell et al. further lacks a teaching that incorporation of the glass fiber into a fiberglass matrix is performed by bonding the organic group within a polymeric material. Mankell et al. discloses that a binder composition conventionally used in the fiberglass industry is applied to the fiberglass matrix either after, or at the same time as, its coating composition (paragraph 0018). Tutin et al. and Buck are cited for their teachings of the conventionality of using epoxy resins as binders in fiberglass batts/matrices (see abstract of Tutin et al., and abstract and col. 11, lines 17-20 of Buck). It would have been obvious for one having ordinary skill in the art to have selected any conventional fiberglass binder, including an epoxy binder as taught by Tutin et al. or Buck, in the fiberglass batt construction process of Mankell et al. with the expectation of successful results, since Mankell et al. specifically states that any conventional binder may be used and is not limiting. It is noted that the use of Mankell et al.'s composition in combination with an epoxy polymeric binder would necessarily include covalent bonding of the organic group of the Mankell et al.'s coating composition within the polymeric binder, since the process of Mankell et al. and applicant use materially similar monolayer/coating materials. This is evidenced by Applicant's own specification in paragraph 0057, which discloses that epoxy polymers have covalent interactions with the monolayers of its invention.

As to claims 3-6 and 34-37, Fukushima et al. teaches an exemplary pressure of 1500 psi in Example 3. However Fukushima et al. states "the pressure and/or temperature of the compressed carbon dioxide is/are selectively controlled so as to enhance the density of the self-assembled monolayer on the substrate" (paragraph 0016). Fukushima et al. also states in

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paragraph 0053 “as used in the context of the present invention ... the term compressed carbon dioxide is intended to include also supercritical carbon dioxide.” Therefore Fukushima et al. teaches that the pressure would be optimized through routine experimentation. It is well settled that determination of optimum values of cause effective variables such as these process parameters is within the skill of one practicing in the art. *In re Boesch*, 205 USPQ 215 (CCPA 1980).

As to claims 16-18, Fukushima et al. teaches exposing the substrate to the precursor molecules for a time of two hours, which meets the claimed limitations.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kirsten C. Jolley whose telephone number is 571-272-1421. The examiner can normally be reached on Monday to Tuesday and Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on 571-272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Kirsten C Jolley/
Primary Examiner, Art Unit 1792

kcj